

comes putrid. If milk should putrify it would have such a disagreeable taste that no one would willingly drink it.

Pasteurization does destroy many of the lactic-acid-producing bacteria; for this reason pasteurized milk usually keeps sweet longer than milk.

BELIEF.—Bacteria that get into pasteurized milk multiply faster than they would in raw milk.

ACT.—Experiments show that bacteria added to pasteurized milk and bacteria added to raw milk multiply at about the same rate.

BELIEF.—Pasteurization leads to careless handling of raw milk; farmers and other milk handlers, knowing milk is to be pasteurized, relax their efforts to keep raw milk clean.

ACTS.—Pasteurization has led to more careful handling of raw milk.

At present, high standards for sanitary handling of raw milk to be pasteurized are prescribed by law in practically all States; these standards apply to both farms and dairy plants. In addition, most States prohibit the handling of milk by any person who has a transmissible disease.

BELIEF.—Pasteurization may be carelessly done; therefore it is not always effective.

ACTS.—Mechanical controls on commercial pasteurizing equipment have reduced the chances for carelessness. These controls automatically return milk that is inadequately processed to the part of the pasteurizer that holds the raw milk.

Official inspection in all pasteurizing plants. A further check on carelessness. The inspection includes chemical tests of the pasteurized milk; these tests show whether the milk has been properly processed.

BELIEF.—Pasteurization inactivates certain enzymes that human beings need to get from milk.

ACT.—There is no present evidence that pasteurization inactivates any enzyme that human beings must get from milk.

BELIEF.—Pasteurization destroys the vitamins in milk and so destroys much of its food value.

ACTS.—Of the several vitamins present in milk, only two—the B-vitamin thiamine and vitamin C (ascorbic acid)—are materially reduced. These vitamins are supplied abundantly in certain other foods. Pasteurization does not destroy

other vitamins or other nutrients in milk. When milk is used as the main food, as it is in infant feeding, it should be supplemented with a source of vitamin C, such as orange juice.

BELIEF.—Babies do not digest pasteurized milk as thoroughly or as easily as they digest raw milk.

FACTS.—How thoroughly babies digest milk can be judged by their daily weight gains. Feeding experiments have shown that there is only a slight difference in daily gains made by babies on raw milk and those on pasteurized milk. In many cases the difference is in favor of pasteurized milk.

Other experiments have shown that pasteurized milk is more easily digested than raw milk by most infants.

BELIEF.—Pasteurized milk has a cooked taste.

FACT.—Proper pasteurization does not injure flavor of milk. If a cooked flavor is present, it is due to overheating or to heating too fast. With the pasteurizing apparatus now available, temperatures can be controlled so that flavor is not affected.

BELIEF.—Pasteurization is too expensive.

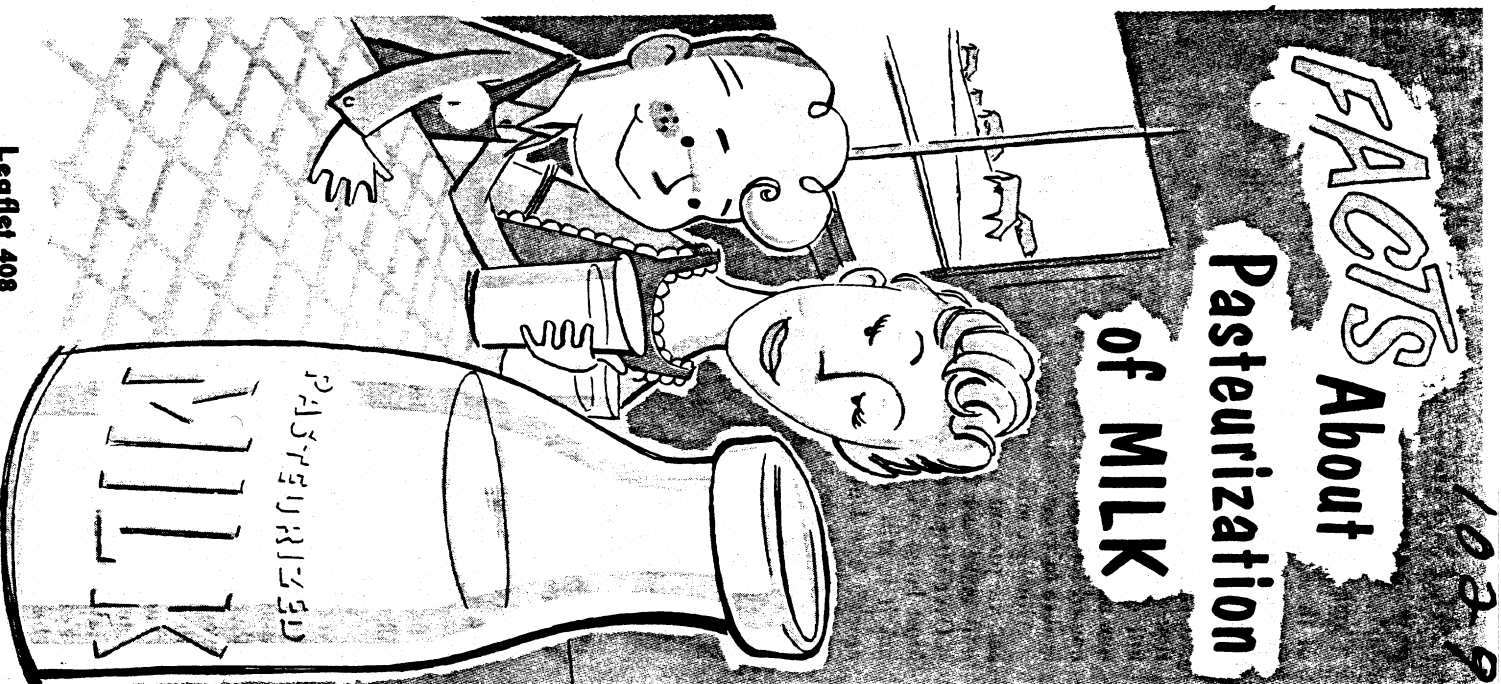
FACTS.—When milk is pasteurized in large quantities, the cost is but a fraction of a cent a quart. If smaller quantities are handled, the cost may rise to about a cent a quart.

BELIEF.—Pasteurization is unnecessary in rural areas because milk goes directly and promptly from producer to consumer.

FACTS.—Pasteurization is necessary in rural areas. A large proportion of the epidemics of milk-borne diseases have occurred outside of the cities. Of these, practically all have had their sources on farms.

This leaflet was prepared by the Eastern Utilization Research Branch, Agricultural Research Service. It supersedes Leaflet 177, The Pasteurization of Milk.

Washington, D. C.



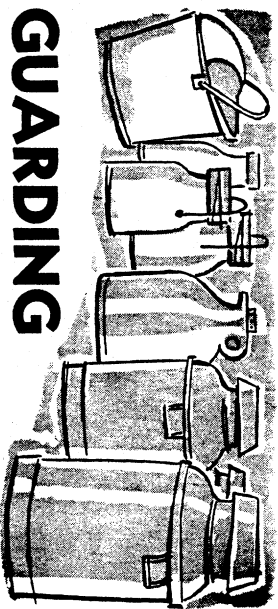
FACTS ABOUT PASTEURIZATION OF MILK

Milk, one of our best foods, contains bacteria. Most of these are either harmless or beneficial; but there may be present bacteria that cause some of our most diseases. Pasteurization kills disease-producing bacteria, and thus makes milk safe to drink.

Pasteurization does not involve complete sterilization. It is the process of heating milk sufficiently to kill disease-producing bacteria and to diminish the numbers of other micro-organisms. The process is named for Louis Pasteur, who first developed the procedure to prevent spoilage of other food products.

Although milk can be contaminated after pasteurization, present methods of packaging and handling milk make such an occurrence unlikely.

Over 90 percent of all market milk is pasteurized. Most large cities do not permit the sale of raw milk, but it is still sold in many smaller towns and rural areas. The United States Department of Agriculture recommends the pasteurization of all market milk.



GUARDING AGAINST DISEASE

People in a community that permits the sale of raw milk are in danger of getting milkborne diseases.

Numerous outbreaks of typhoid fever, paratyphoid fever, diphtheria, septic sore throat, scarlet fever, dysentery, Q-fever, and gastroenteritis in the United States have been traced to bacteria in raw milk. Other diseases, including tuberculosis and undulant fever, may be transmitted to human beings in the raw milk from diseased cows.

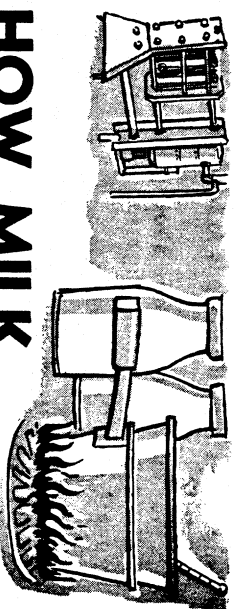
There are numerous ways that disease-causing bacteria can get into raw milk, even though great care is taken to keep such milk clean and safe.

For example, it is impossible for health authorities to be sure that all persons who handle milk before it is bottled or packaged are free from disease-causing bacteria that can be transmitted by human beings.

A particular hazard is the carrier—that is, a person who harbors and transmits a communicable disease to which he himself is immune.

It is also impossible to be sure that all dairy farms are free at all times from polluted water and other sources of contamination. Nor can it be certain that milk from a diseased cow will not accidentally enter the milk supply.

It takes only a few disease-causing bacteria to make milk unsafe. Once they are in milk, the bacteria thrive; soon they multiply into enormous numbers.



HOW MILK IS PASTEURIZED

Commercial Pasteurization

Milk for direct consumption is pasteurized commercially by one of two processes.

In the *holder* process, milk is heated until every particle reaches a temperature of at least 145° F.; it is held at this temperature for at least 30 minutes.

In the *short-time, high-temperature* process, milk is heated until every particle reaches a temperature of at least 161° F.; it is held at this temperature for at least 15 seconds.

Milk pasteurized by either process is cooled immediately to 50° F. or lower.

Home Pasteurization

Milk may be pasteurized effectively at home by one of the three methods described below.

In the bottle.—Remove the cover from one bottle and pour out a little of the milk. Punch a hole in the cover and replace the cover. Insert a thermometer in the hole.

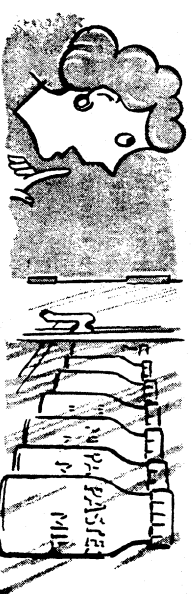
Place bottles of milk on a rack in a pail. Pour warm water into the pail until the water is level with the milk. Heat until the thermometer in the milk registers 145° F. Stop heating. Leave bottles in the hot water for 30 minutes; reheat slightly if necessary to keep the milk at 145°.

After 30 minutes, replace the hot water gradually with cold water until the milk has cooled. If possible, use ice in the last cooling water. After the milk cools, keep it cold.

In double boiler.—Pour milk into top of double boiler. Insert a thermometer in the milk. Heat over hot water until the thermometer registers 161° F.; stir the milk constantly while it heats.

When milk reaches 165° F. remove the top of the double boiler and set it in cold water; change the water frequently or put ice in the water. Continue to stir the milk until it is cool. Cover the container of milk and store it in a cold place.

In batch-type home pasteurizer.—Electric batch-type home pasteurizers with a capacity of 2 gallons or more can be bought from supply houses. As little as 2 quarts of milk can be pasteurized in these appliances. They are nearly automatic; pasteurization can be carried out properly with only a little attention. Operating directions for these pasteurizers are provided by the manufacturers.



MISTAKEN BELIEFS ABOUT PASTEURIZATION

Though nearly all physicians, sanitarians, and dairymen have long favored pasteurization, some opposition to it exists. Most objections are based on mistaken beliefs about this process.

Some of the more persistent of these beliefs are stated below, along with the facts that disprove them.

BELIEF.—Putrefactive—or decay-producing—bacteria multiply much faster in pasteurized milk than they do in raw milk, because heating kills the lactic acid-producing bacteria that check the development of the decay-producing organisms in raw milk.

FACTS.—Pasteurized milk is not a better medium for the growth of putrefactive bacteria than raw milk. Milk, either raw or pasteurized, rarely